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FROM THE EDITOR

Welcome to the second online edition of *Missouriensis,* the official technical publication of the Missouri Native Plant Society (MONPS). After some unexpected delays, the journal has now been assigned official International Standard Serial Numbers (ISSN) for both the electronic editions such as this issue (ISSN 2576-2338) and retroactively for previous print issues (ISSN 2576-2311). Having a valid ISSN number is a requirement for valid publication of taxonomic matters such as new species and new combinations. Because the first online issue (Volume 34) had not yet been assigned an ISSN number at the time of publication, a previous taxonomic issue is resolved with publication in this volume.

As before, articles in this issue are freely available online as open source, archival pdf files, making the journal more widely available and searchable through various online databases. Each article is available as an individual pdf; additionally, a composite pdf of the entire issue is sent to all current members of the Society.

Through a formal agreement signed in summer 2017, *Missouriensis* is now an official participant in the Biodiversity Heritage Library (https://www.biodiversitylibrary.org/), whose mission is *"Inspiring discovery through free access to biodiversity knowledge."* The Biodiversity Heritage Library collaboratively makes biodiversity literature openly available through a network of 80 participating centers, and also serves as the foundational literature component of the Encyclopedia of Life. Participation in this initiative will make the journal more readily accessible and searchable from a global perspective.

Missouriensis is focused on articles that increase knowledge related to Missouri plants, vegetation, natural communities, conservation, ecological restoration and associated topics. In recognition of rapid changes in journals and publications, effective 1 January 2012, electronic-only publication of new nomenclatural acts is valid under the *International Code for Botanical Nomenclature*, rendering this new format for *Missouriensis* an effective window for taxonomic publication. As always, inquiries regarding potential articles and suggestions for improving the journal are welcome.

Many individuals contributed to the production of this issue. Special appreciation is extended to those who generously donated time as reviewers and provided advice and editorial assistance: Mike Arduser, Missouri Department of Conservation (retired); Gerrit Davidse, Missouri Botanical Garden; Craig Freeman, University of Kansas; James Lendemer, New York Botanical Garden; Paul McKenzie, U.S. Fish and Wildlife Service; Caleb Morse, University of Kansas; Paul Nelson, U.S. Forest Service (retired); Cindy Pessoni, The Nature Conservancy; Mike Skinner, Missouri Department of Conservation (retired); Justin Thomas, NatureCITE; Gerould Wilhelm, Conservation Research Institute; George Yatskievych, University of Texas. Thanks also to MONPS president John Oliver and MONPS webmaster Brian Edmond for their assistance and suggestions.

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Corrected new combination for *Dichanthelium inflatum*

JUSTIN R. THOMAS[1]

[EDITOR'S NOTE — Through an erroneous assumption on my part, the previous issue of *Missouriensis* (Volume 34) did not have an assigned ISSN number at the time of publication, although the application was pending. This invalidated the new combination published in that issue. Justin Thomas has generously agreed to validate the name by republishing the combination here. Thanks to Gerrit Davidse for bringing this issue to my attention.]

The following new combination (Thomas 2017) was published before *Missouriensis* had acquired an International Standard Serial Number (ISSN). According to Art. 29.1 (Melbourne Code), publication in solely electronic journals that lack an ISSN does not constitute effective publication. Now that the journal has an ISSN, I am resubmitting the name as a new combination. I am also including the original notes regarding the taxon below, as published in Thomas (2017).

Dichanthelium inflatum* (Scribn. & J.G. Sm.) J.R. Thomas *comb. nov.
Panicum inflatum Scribn. & J.G. Sm. Circular, Division of Agrostology, United States Department of Agriculture 16: 5. 1899. (1 Jul 1899). *Panicum sphaerocarpon* subsp. *inflatum* (Scribn. & J.G. Sm.) Hitchc. Contributions from the United States National Herbarium 15: 253, f. 275. 1910. *Panicum sphaerocarpon* var. *inflatum* (Scribn. & J.G. Sm.) Hitchc. Manual of the Grasses of the United States 643, 913. 1935. **USA**. **Mississippi**. Harrison Co.: Biloxi, 18 Oct 1898, *S.M. Tracy* #4622 (US!; isotype: MO!).

"This new combination is necessary to accommodate plants that diverge significantly from the morphology of *D. sphaerocarpon*. Hitchcock and Chase (1951) and Fernald (1950) recognized *inflatum* infraspecifically (subsp. by the former and var. by the latter) as differing from typical *Panicum sphaerocarpon* by being taller, with linear-lanceolate blades that are ≤1 cm wide, with nearly parallel margins. They also noted that *inflatum* differs in having a noticeable ligule to 1 mm long and spikelets 1.3-1.5 mm long (compared to the obsolete ligule and spikelets 1.5-1.8 mm long in *D. sphaerocarpon*). This morphology has a strong geographical component, as specimens are restricted to the southern coastal plain from Maryland to Texas. In preparation for an upcoming treatment for *Dichanthelium* in Arkansas, I conducted a thorough review of numerous specimens from Arkansas and throughout the southeast and was surprised at the consistency of these characters. Additionally, most specimens of *D. inflatum* consistently have few (≤15) ciliate hairs per side at the base of vernal blades, compared to *D. sphaerocarpon* (>15). Given how consistently

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these characters differentiate the two taxa and given their geographical affinity, the elevation to species seems justifiable and warranted."

LITERATURE CITED

Fernald, M.L. 1950. Gray's Manual of Botany, 8th ed. American Book Co., New York.

Hitchcock, A.S. and M.A. Chase. 1951. Manual of the Grasses of the United States, revised 2nd ed. United States Printing Office, Washington, D.C.

Thomas, J.R. 2017. New additions, vouchers of old additions, and a new combination (*Dichanthelium inflatum*) for the Missouri flora. Missouriensis, 34: 4-19. 2017.

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Evidence that *Carex ×deamii* may be derived from a cross between *C. squarrosa* and *C. shortiana*

PAUL M. MCKENZIE[1] AND BRUCE HENRY[2]

ABSTRACT. — The status and history of *Carex ×deamii* are discussed, with detailed information on Missouri populations. Evidence for the role in *Carex squarrosa* in the parentage of this hybrid sedge is discussed.

Carex ×deamii F.J. Hermann was first described by Frederick J. Hermann from specimens taken in Indiana in 1934 (Hermann 1938; see also Deam 1940 and Steyermark 1963) (Figure 1A). Subsequently, this taxon was collected from Missouri, Illinois, and Kentucky (Hess and Shildneck 1982; Mohlenbrock 1999; Ford and Reznicek 2002; Hill 2010). In Missouri, Steyermark (1963) reported *C. ×deamii* from Adair, St. Louis, Howell, and Barton counties. Notably, *C. ×deamii* is an intersectional hybrid as *C. shortiana* is in Section SHORTIANAE, while *C. squarrosa* and *C. typhina* are in Section SQUARROSAE. Ball and Reznicek (2002) commented that while a few intersectional hybrids are known in the genus *Carex*, most are between species in the same section.

Hermann (1938) postulated that the likely parents of *Carex ×deamii* were *Carex shortiana* Dewey and *Carex typhina* L. (see Ford and Reznicek 2002), as both species were reported as associates at the type locality. Hermann (1938) did not comment on whether *C. squarrosa* L. was also present. Steyermark (1963) noted that *C. typhina* and *C. shortiana* occurred at most Missouri sites where *Carex ×deamii* had been documented but also stated that *C. squarrosa* was present at most locations. Mohlenbrock (1999) reported that although *C. shortiana* and *C. typhina* were present at the Illinois sites for *Carex ×deamii*, *C. squarrosa* also occurred. Subsequent authors (e.g. Yatskievych 1999; Cochrane 2002) have suggested that it is likely that one parent of the hybrid is *C. squarrosa* rather than *C. typhina.* Recent collections and observations by the authors in Reynolds County, Missouri while conducting a mark/recapture study involving the federally listed Hine's emerald dragonfly (*Somatochlora hineana*) provide strong evidence supporting this hypothesis.

On 20 June 2014, the senior author discovered one large clump of *Carex ×deamii* at *Onoclea* Fen at Johnson's Shut-Ins State Park in Reynolds County, Missouri (Figure 1B). Voucher specimen: *McKenzie 2552* (MO); http://www.tropicos.org/Specimen/10085804. Both *C. shortiana* and *C. squarrosa* were common and scattered throughout the fen. Searches throughout the fen failed to document *C. typhina* or any additional clumps of *C. ×deamii.*

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Figure 1. **A**: Isotype of *Carex* ×*deamii*, F.J. Hermann 6147, 5 June 1934 (MO); **B**: Inflorescence of *Carex* ×*deamii*, Johnson's Shut-Ins State Park, *Onoclea* Fen, 20 June 2014, photo by Richard Day.

On 16 June 2015, the senior author discovered one large clump of *C.* ×*deamii* at Centerville Slough Fen in Reynolds County, Missouri: *McKenzie 2596* (MO); http://www.tropicos.org/Specimen/100858090. This site is approximately 9.7 air miles southwest of the Johnson's Shut-Ins State Park fen. As at the first site, *C. shortiana* and *C. squarrosa* were present at the Centerville Slough site but *C. typhina* was absent (Figure 2). Further searches in the fen failed to yield any additional clumps of the hybrid.

Figure 2. Centerville Slough Fen, Missouri, 16 June 2015. **A**: Habit of *Carex* ×*deamii*; **B**: Inflorescence of *Carex* ×*deamii*; **C**: Comparison of *C. shortiana* (left), *Carex* ×*deamii* (center), and *C. squarrosa* (right). All photos by Garret Hargiss.

Subsequent to these discoveries, Henry discovered two additional clumps of *C.* ×*deamii*, approximately 400 m apart at Trolinger Fen in Reynolds County on 20 June 2016 (Figure 3). As with observations made in 2014 and 2015, *C. shortiana* and *C. squarrosa* were present at the 2016 locality but *C. typhina* was absent.

Figure 3. Inflorescence of *Carex* ×*deamii*, Trolinger Fen, 20 June 2016. Photo by Bruce Henry.

Superficially, *Carex* ×*deamii* is similar to *C. shortiana* in having subcylindric spikes that are thicker (7-8 mm) vs. 3.5-5.6 mm, and having perigynia similar to *C. squarrosa* but with more compressed bodies and perigynia beaks that are intermediate (~1-1.5 mm) between *C. shortiana* and *C. squarrosa* (Cochrane 2002; Steyermark 1963; Yatskievych 1999).

At the four recently documented sites of *C.* ×*deamii* from Reynolds County, Missouri *C. shortiana* and *C. squarrosa* were present but *C. typhina* was absent. A review of the Tropicos database (http://www.tropicos.org/NamePage.aspx?nameid=9900072&tab=specimens) reveals 91 records of *C. typhina* scattered across 34 Missouri counties. Notably, there are no documented records of *C. typhina* for Reynolds County. The co-occurrence of *C. shortiana* and *C. squarrosa* at the four recently discovered sites for *C.* ×*deamii* and the lack of records of *C. typhina* at these locations and Reynolds County provide strong evidence for the correct parentage of this uncommon hybrid as suggested by Cochrane (2002). It is still unknown if *C.* ×*deamii* can result from a cross between *C. shortiana* and *C. typhina* as suggested by Hermann (1938). Botanists who discover additional populations of *C.* ×*deamii* should determine if *C. squarrosa* and/or *C. typhina* co-occur with *C. shortiana.* Molecular studies may also be useful in further assessing the parentage of this rare hybrid.

LITERATURE CITED

Ball, P.W. and A.A. Reznicek. 2002. *Carex*. *In*: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 20+ vols. New York and Oxford. Vol. 23, pp. 254-273.

Cochrane, T.S. 2002. *Carex* L. sect. Shortianae. *In*: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 20+ vols. New York and Oxford. Vol. 23, p 520.

Deam, C.C. 1940. Flora of Indiana. Indiana Department of Conservation, Indianapolis.

Ford, B.A. and A.A. Reznicek. 2002. *Carex* L. sect. Squarrosae. *In*: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 20+ vols. New York and Oxford. Vol. 23, pp. 518-519.

Hermann, F.J. 1938. New or otherwise interesting plants from Indiana. Rhodora 40: 77-88.

Hess, W. J., and P. Shildneck. 1982. *Carex* x *deamii* Herm. (Cyperaceae) in Illinois. Transactions of the Illinois State Academy of Science. 75: 135-136.

Hill, S.R. 2010. New and noteworthy sedge records in Illinois. Transactions of the Illinois State Academy of Science 103(3&4): 85-96.

Mohlenbrock, R.H. 1999. The Illustrated Flora of Illinois. Sedges: *Carex*. Southern Illinois University Press, Carbondale and Edwardsville.

Yatskievych, G. 1999. Steyermark's Flora of Missouri. Volume 1, revised ed. Missouri Department of Conservation, Jefferson City.

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An artificially disjunct population of coastal indigo, *Indigofera miniata* (Fabaceae), new to Missouri

CLAIRE CIAFRÉ[1]

ABSTRACT. — *Indigofera miniata* is reported new to Missouri from a population discovered in Clark County. Identification features and potential establishment vectors are discussed.

Indigofera miniata Ortega, known as coastal indigo or scarlet pea, was found in a warm-season grass planting within Rose Pond Conservation Area in Clark County, Missouri. According to General Land Office notes written in 1820, the Rose Pond area had been part of a large marsh system surrounded by sand prairie. Given a long history of anthropogenic land use, however, there is no remnant sand prairie left in the area and the marsh is much reduced in size. The majority of Rose Pond area was purchased in 1983 by the Missouri Department of Conservation (MDC), ultimately resulting in the 382-acre conservation area (MDC 2015). The higher ground surrounding the extant marsh had been farmed, primarily with corn and soybeans, until acquisition. Since acquiring the land, MDC staff have planted warm-season grasses in some of the upland areas; these plantings are burned at approximate three-year intervals (K. Noel, MDC, personal communication).

On 9 July 2017, members of Missouri Native Plant Society visited Rose Pond to explore the extant marsh. On the hike in to the marsh, the author discovered a small population of an unknown legume. A voucher specimen was collected by the author and later identified as *I. miniata* by Justin Thomas. Six stems were present at this site, all growing within a 1 m^2 area in the southeast warm-season grass planting. Associated species included *Schizachyrium scoparium, Poa pratensis, Ambrosia psilostachya,* and *Heterotheca subaxilaris*.

One or two individuals were beginning to bloom on July 9. No developing seeds were observed at that time, nor during a follow-up visit by MDC Natural History Biologist Krista Noel the week of July 26. This is consistent with the phenology for the species in Oklahoma, where it is known to bloom from May to August (Folley 2011). It is likely that these specimens were visited too early in the growing season to observe seed formation, but it is unknown whether successful fruiting will occur this far north.

Voucher specimen: **U.S.A. MISSOURI**: CLARK CO.: Rose Pond Conservation Area, six stems present. WGS84 coordinates -91.506874, 40.33273, 9 July 2017, *Ciafré 2* (MO).

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Coastal indigo is a perennial that commonly grows in sandy soils and on sand dunes in the southern great plains (Contu 2012, Kartesz 2015). It can be distinguished from *Tephrosia virginiana* (L.) Pers. (goat's rue) and *Glycyrrhiza lepidota* Pursh (American licorice) using the following key adapted from the Keys to the Flora of Arkansas (Smith 1994, Yatskievych 2013):

1. Plants procumbent or prostrate to ascending; leaflets alternate, 5-7(-9)/leaf; fresh corolla purplish-red, ca. 8-9 mm long……*Indigofera miniata*
1. Plants erect or ascending; leaflets opposite, ≥9/leaf; fresh corolla mostly other colors and >9 mm long
    2. Leaflets glandular-punctate……..……..*Glycyrrhiza lepidota*
    2. Leaflets not glandular-punctate……..……..*Tephrosia virginiana*

This species is known to occur in native grasslands and roadsides in southern Kansas, Oklahoma, eastern Texas, southwest Arkansas, Louisiana, southern Alabama, Georgia, and Florida (Great Plains Flora Association 1986, Kartesz 2015). This new population is more than 300 miles from the nearest record in Oklahoma (Kartesz 2015).

It is unlikely that this population is a native element of the region's flora. The unspecified sand-adapted variety of *S. scoparium* seed used by MDC at this site originated in Oklahoma, where coastal indigo often co-occurs with this grass. It is assumed that this seed was chosen because of its adaptation to the conditions at Rose Pond (Krista Noel, MDC, personal communication). Given the highly disturbed nature of the site and its distinct separation from other populations, introduction to the site via seed contamination is the most likely explanation. The restoration seed was planted in the late 1990s, so if this population did come from Oklahoma seed, it has persisted for at least fifteen years, but has not apparently spread extensively (K. Noel, MDC, personal communication).

This species is easily overlooked because of its procumbent habit. Most members of *Indigofera* disperse by way of explosive dehiscence, making long-distance movement difficult (Chauhan and Pandey, 2014). While it is unlikely to naturally spread to another site, it may do so via farm equipment, in hay, or in collected seed. Other sandy sites where Oklahoma seed sources have been utilized should also be identified and surveyed for this species. Botanists working in sandy soil along the Mississippi river corridor should also keep an eye out for this species.

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LITERATURE CITED

Chauhan, V. and A.K. Pandey. 2014. Structure and evolution of the pod in *Indigofera* (Fabaceae) reveals a trend towards small thin indehiscent pods. Botanical Journal of the Linnean Society, 176(2): 260-276.

Contu, S. 2012. *Indigofera miniata*, Coastal indigo. The IUCN red list of threatened species 2012: e.T19892543A20086067. Accessed 8/20/2017 from http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T19892543A20086067.en.

Folley, P. 2011. The Guide to Oklahoma Wildflowers. University of Iowa Press, Iowa City.

Kartesz, J.T. The Biota of North America Program (BONAP). 2015. North American Plant Atlas. (http://bonap.net/napa). Chapel Hill, N.C. [maps generated from Kartesz, J.T. 2015. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). (in press)].

MDC. 2015. Rose Pond Conservation Area management plan. Accessed 7/11/2017 from: https://mdc.mo.gov/sites/default/files/area_plans/2015_rose_pond_conservation_area_plan.pdf.

Smith, EB. 1994. Keys to the Flora of Arkansas. University of Arkansas Press, Fayetteville, AR.

Yatskievych, G. 2013. Steyermark's Flora of Missouri. Volume 3, revised ed. Missouri Botanical Garden Press, St. Louis.

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New upland sites for *Trifolium stoloniferum* (Fabaceae) in Missouri, with comments on the identification of sterile material

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ABSTRACT. — Previous Missouri records of *Trifolium stoloniferum* have been from disturbed areas with riparian influences. We report three new sites for *T. stoloniferum* from disturbed wooded uplands in Montgomery County. Techniques for distinguishing sterile material of *T. stoloniferum* from *T. repens* are presented. The discovery of *T. stoloniferum* on upland woodlands in Missouri provides increased opportunities to find additional sites of running buffalo clover in the state in similar habitats.

The status and history of *Trifolium stoloniferum* (running buffalo clover) (RBC) in Missouri were recently review by McKenzie and Newbold (2015). Based on May 2017 monitoring at extant sites in Missouri (Newbold, McKenzie, Schuette, pers. obs.), there were five documented records for this species: two at Cuivre River State Park in Lincoln County, two on private property in Callaway County, and one at Graham Cave State Park in Montgomery County. Most sites within riparian corridors were significantly impacted by floods that occurred throughout the state in late April and early May 2017. The Crow's Fork Creek site on private property in Callaway County was significantly damaged by deposition of silt and sand (Figure 1). The number of flowering stems decreased from 118 rooted crowns and 141 flowering heads in 2016 (Chris Newbold, unpubl. report) to 4 rooted crowns and 3 flowering stems when the site was visited in 2017 (Chris Newbold, unpubl. data 2017). Although covered by the late April 2017 flood waters, the population near the boat ramp at Graham Cave State Park rebounded throughout the summer, and the authors observed numerous rooted crowns on 29 August 2017. On 30 October 2017, a count by Lorie Volenberg yielded an impressive 114 rooted crowns. This population appears to be responding favorably to management by park staff, especially light mowing that does not remove rooted RBC plants but eliminates competitive vegetation.

On 25 April 2017, Volenberg discovered a sterile population of RBC at a new location at the park (Figure 1). Unlike other extant and historic sites, the population occurred along a mostly upland hiking trail directly adjacent to the mouth of Graham Cave, at an elevation of ~610 ft. A total of 40 rooted crowns were counted along a small area of trail in a Cedargap and Stulz soil

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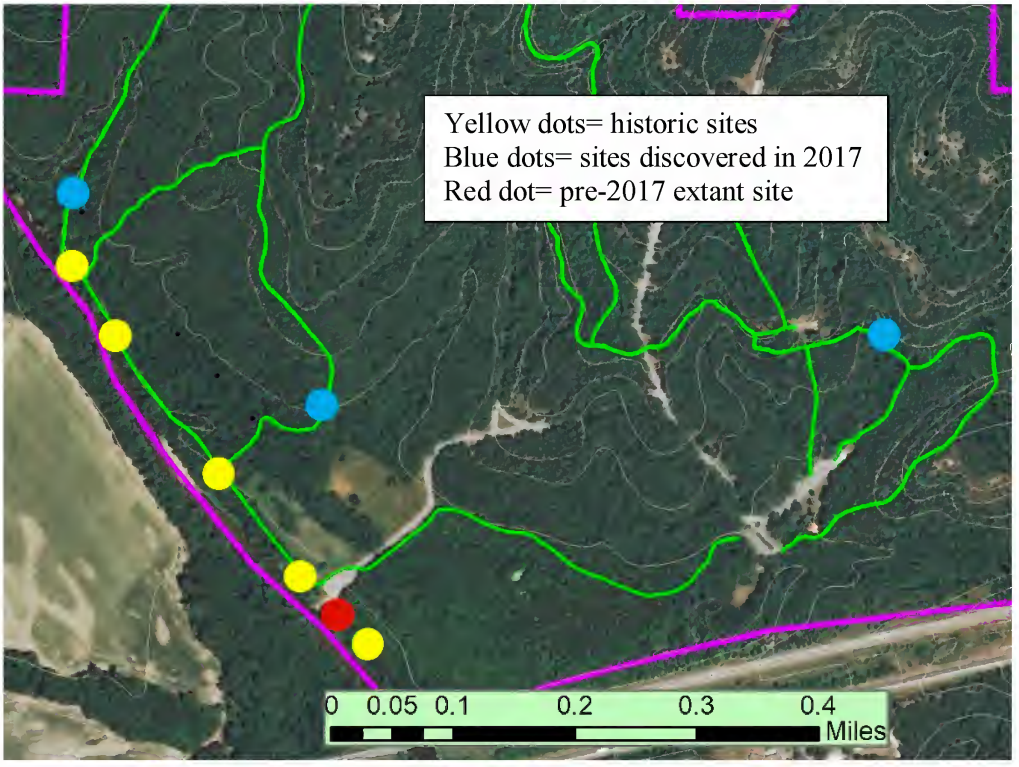
that was formed from alluvium in an upland forest drainage way (Dennis Meinert, Missouri DNR unpub. report, 2009). Associates at this site included: *Asimia triloba*, *Carex grisea*, *Cubelium concolor*, *Impatiens* sp., *Elymus villosus*, *Leersia virginica*, *Similax* sp., and *Symphoricarpus orbiculatus*.

On 12 October 2017, a second upland population of 47 rooted crowns of *Trifolium stoloniferum* was found by Peter Hayes along a hiking trail southwest of the campground parking lot (Figure 2). The plants were scattered along an approximate 15 ft. section of the trail in a shaded woodland dominated by *Quercus alba* (Figure 3). Associates at this location included: *Asarum canadense*, *Carex jamesii*, *Celtis occidentalis*, *Cornus florida*, *Diarrhena obovata*, *Eupatorium purpureum*, *Leersia virginica*, *Oxalis* sp., *Parthenocissus quinquefolia*, *Persicaria longiseta*, *Phlox divaricata*, *Quercus imbricaria*, *Symphyotrichum* sp., *Ulmus rubra*, and *Viola sororia*. Species concepts and nomenclature in this report follow Yastkievych (1999, 2006, 2013).

The newest locations within Graham Cave State Park are in the Montgomery-Warren Oak Woodland/Forest Rugged Hills Land Type Association (LTA) as described by Nigh and Schroeder (2002). The LTA is in the Outer Ozark Border Subsection of the Ozark Highlands Section and is characterized by narrow, loess-covered ridges, steep slopes, and deep, narrow valleys. Most uplands are underlain by Mississippian and Devonian limestone, with the valleys consisting of Ordovician St. Peter Sandstone and Jefferson City-Cotter Dolomite (Nigh and Schroeder 2002). At Graham Cave the lower slopes with the new *Trifolium stoloniferum* locations are in sandy alluvium and colluvium below the St. Peter Sandstone formation and outcrops. The natural communities associated with these two new running buffalo clover populations are outside the Loutre River floodplain and are on the natural community border between dry-mesic sandstone woodland and mesic sandstone forest as described by Nelson (2005).

On 20 October 2017, the authors surveyed additional upland and bottomland sites within a half mile radius of the newest location and located yet another small population along a hiking trail that parallels the Loutre River (Figure 4). This site was approximately 0.25 mi. northwest of the hillside site, but within the riparian corridor of the Loutre River. Seven rooted crowns were located along the trail, approximately 10 feet lower in elevation than the hillside site. Associates at this site included *Acer sacharinum*, *Amphicarpaea bracteata*, *Celtis occidentalis*, *Cinna arundinacea*, *Fraxinus americana*, *Glechoma hederacea*, *Leersia virginca, Quercus imbricaria, Rubeckia laciniata* var. *laciniata*, *Symphyotrichum* sp., and *Toxicodendron radicans*. The soil type for this location is identical to the description for the *Quercus alba* hillside (Dennis Meinert, Missouri DNR unpub. report, 2009) but the site appears within the Loutre River floodplain. All extant and historic locations of RBC at Graham Cave State Park are depicted in Map 1. Soils of historic locations of *Trifolium stoloniferum* at Graham Cave State Park have been defined as consisting of a coarse and loamy Kaintuck soil formed in alluvium of low floodplains and riverfront forests (Dennis Meinert, Missouri DNR unpub. report, 2009).



Map 1. Historic, pre-2017, and 2017 extant populations of *Trifolium stoloniferum* at Graham Cave State Park. Map provided by Bruce Schuette.

Field identification of sterile specimens of *Trifolium stoloniferum* can be extremely challenging, especially in separating this species from *Trifolium repens*. There are, however, field characters that can be used to distinguish the two species (Table 1). While the leaflets of *T. repens* often have noticeable chevron markings, many populations of this species lack this field mark. This character is also often hard to see when the leaflets are covered with mildew. Additionally, mildew can be present on leaflets of *T. stoloniferum* and can be mistaken as chevrons on the leaflets of some populations of *T. repens.* Some individuals use leaflet shape and size to distinguish *T. stoloniferum* from *T. repens* but we have found this to be an unreliable field mark due to the variation in leaflet shape and size of *T. stoloniferum.* Some of the larger, healthier populations of RBC have large leaflets but depauperate specimens of *T. stoloniferum* can have small leaflets that are amazingly close in size to leaflets of *T. repens*, especially those that lack the chevron markings typical of that species (Figure 5). While both species have stolons, leaves of *T. stoloniferum* are clumped forming "rooted crowns" and are often more scattered and less dense along the stolon than those of *T. repens* (Figure 6). The stolons of *T. stoloniferum* are often stouter than those of *T. repens* and there is often noticeable breakage or even dead stolons between rooted crowns (Figures 6, 7). The rooted nodes along the stolon of *T. repens* are often more numerous and most of the stolons remain intact, unbroken, and alive between plants (Figure 6). Additionally, the leaves arise singularly from the stolon on *T. repens*

rather than the often clumped arrangement on *T. stoloniferum.* Another main difference between the two species is the conspicuous pointed stipule that is at the base of leaf clump of *T. stoloniferum* that is perpendicular to the stolon (Figure 7). In *T. repens*, the stiplues are membranous, inconspicuous, and are parallel to it (Figure 8). This condition can give the impression that the species lacks stipules (see Yatskievych 2013: plate 410, p. 155).

Table 1. Field characters to distinguish sterile material of *Trifolium stoloniferum* from *T. repens*.

SPECIES	PRESENCE OF CHEVRONS ON LEAFLETS	LEAF ARRANGEMENT	NUMBER OF NODES PER STOLON	STOLON CONDITION	STIPULE
T. stoloniferum	Absent	Leaves clumped, forming rooted crowns at nodes	Scattered	Stout and sometimes detached or dead	Long, pointed, and perpendicular to stolon
T. repens	Present or absent	Leaves singular on long pedicels	Numerous and more regularly spaced	Weak, alive and persistent	Inconspicuous, membranous; parallel to and enveloping the stolon

Given the known low seed production of *Trifolium stoloniferum* in Missouri (pers. obs. of authors and Newbold et al.), it is unknown what dispersal mechanism established RBC in these upland sites (see Map 1). It is possible that dispersal occurred via white-tailed deer (*Odocoileus virgianus*), eastern cottontail rabbit (*Sylvilagus floridanus*), or was human assisted.

The discovery of *Trifolium stoloniferum* at two upland sites in central Missouri increases the possibility that undiscovered sites of this species are yet to be found in Missouri. McKenzie and Newbold (2015) recommended surveying for this species on bottomland sites and in riparian corridors. These suggestions led to a survey by a well-qualified botanist in the late spring and early summer of 2016 in northcentral and northeastern Missouri. This survey failed to yield additional sites of RBC in Missouri (Newbold, pers. comm. 2017). We recommend that botanists search for *T. stoloniferum* along game trails, hiking trails, ATV trails, rights-of-ways and other disturbed areas in upland sites, despite the fact that most recent discoveries of RBC in Missouri have been by happenstance. Due to the short flowering period (typically early May-early June) of RBC, we also recommend searching when the species is in sterile condition. With practice and knowledge of the field marks noted above, *T. stoloniferum* can be separated from populations of *T. repens* that lack the characteristic chevrons on leaflets.

LITERATURE CITED

McKenzie, P.M. and C. Newbold. 2015. A new site for running buffalo clover (*Trifolium stoloniferum*: Fabaceae) in Missouri: implications for additional survey needs and suggested management recommendations. Missouriensis 33: 17-25.

Nelson, P.W. 2005. The Terrestrial Natural Communities of Missouri. Missouri Natural Areas Committee. Jefferson City.

Nigh, T.A. and W.A. Schroeder. 2002. Atlas of Missouri Ecoregions. Missouri Department of Conservation, Jefferson City.

Yatskievych, G. 1999. Steyermark's Flora of Missouri. Volume 1, revised ed. Missouri Department of Conservation, Jefferson City.

Yatskievych, G. 2006. Steyermark's Flora of Missouri. Volume 2, revised ed. Missouri Botanical Garden Press, St. Louis.

Yatskievych, G. 2013. Steyermark's Flora of Missouri. Volume 3, revised ed. Missouri Botanical Garden Press, St. Louis.

FIGURES

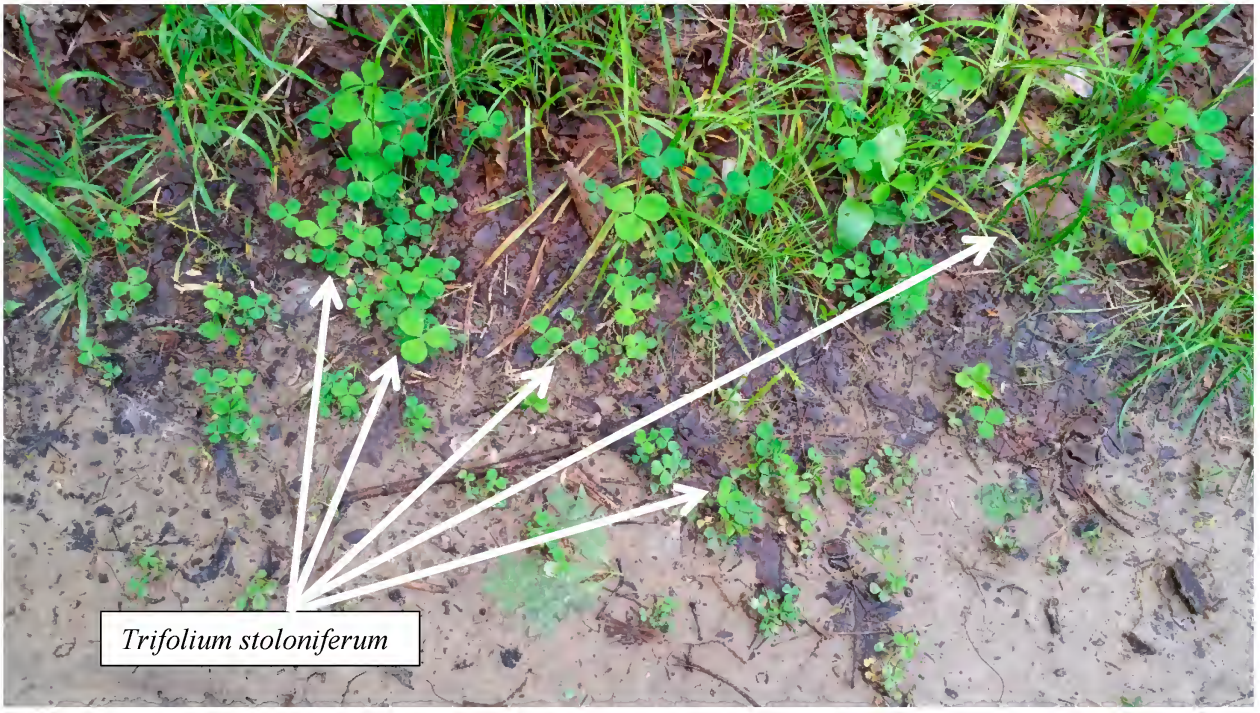


Figure 1. *Trifolium stoloniferum*, near mouth of Graham Cave, Graham Cave State Park, 4 May 2017. Photo by Paul McKenzie.

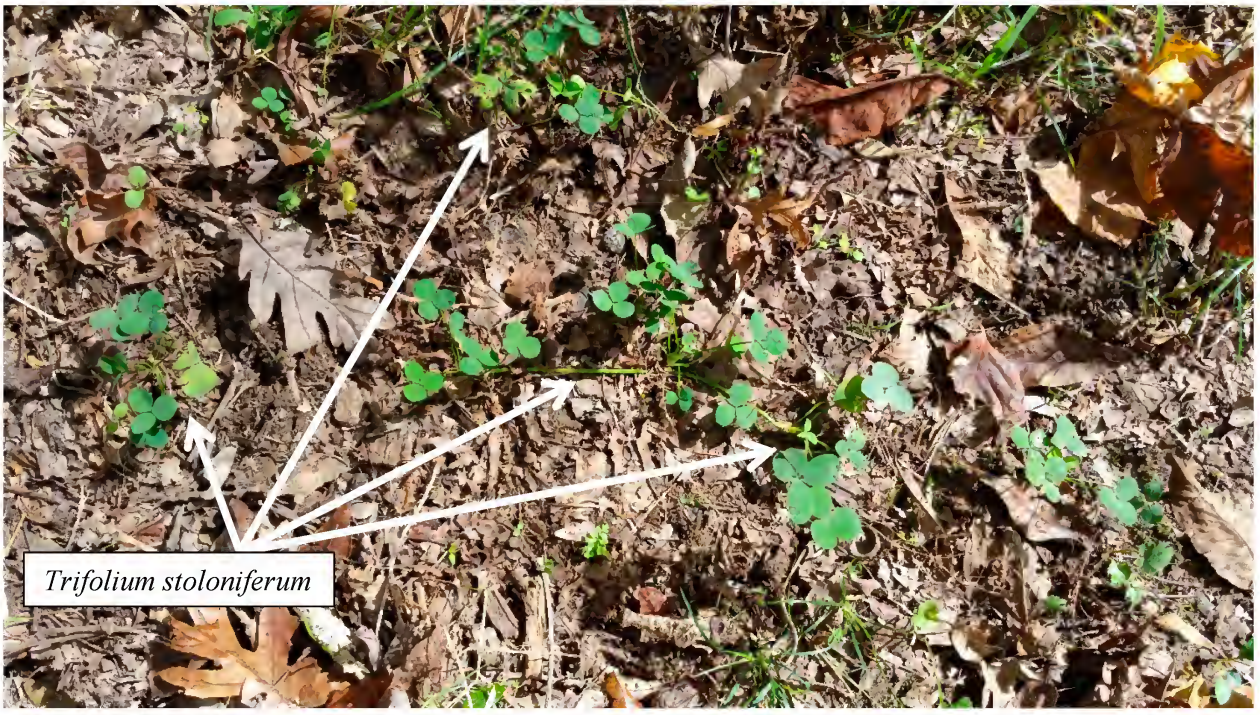


Figure 2. *Trifolium stoloniferum,* along hiking trail near campground, Graham Cave State Park, 20 October 2017. Photo by Paul McKenzie.

Figure 3. Overall habit of upland site for *Trifolium stoloniferum* in *Quercus alba* forest, near campground, Graham Cave State Park, 24 October 2017. Photo by Bruce Schuette.

Figure 4. *Trifolium stoloniferum*, along hiking trail paralleling the Loutre River, Graham Cave State Park, 24 October 2017. Photo by Paul McKenzie.

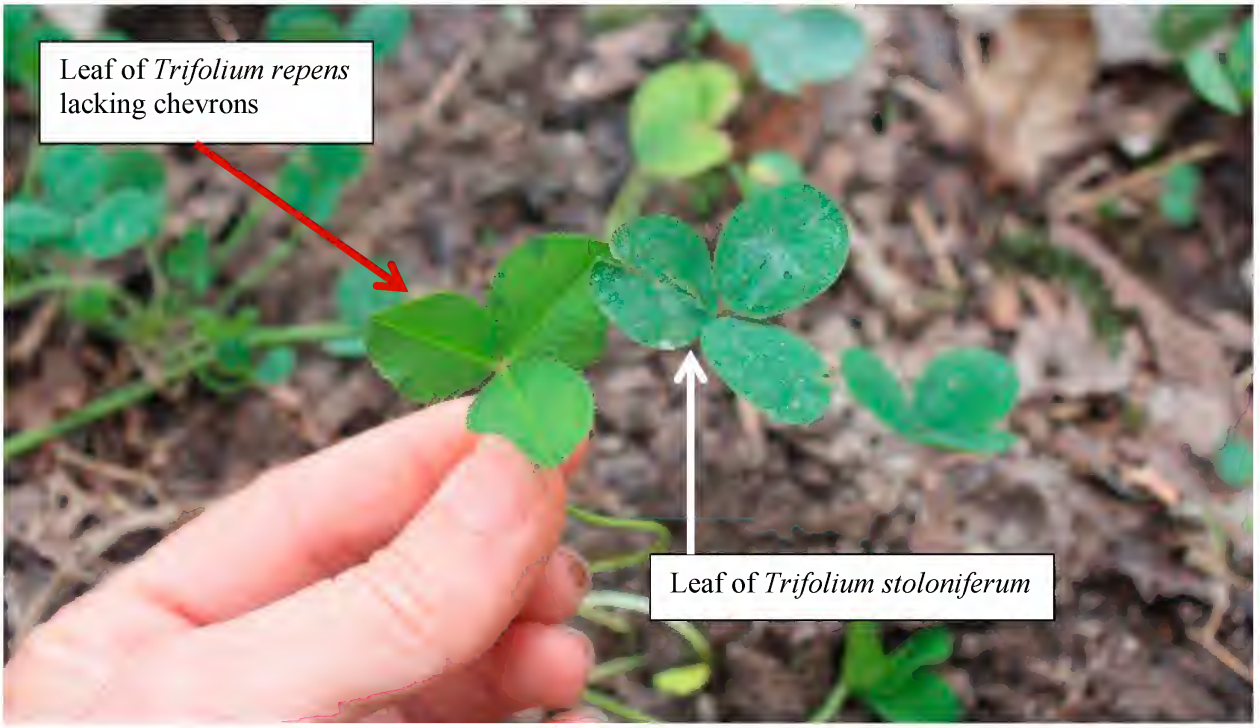


Figure 5. Similarity of leaf shape of *Trifolium repens* leaf lacking chevrons (left) and *Trifolium stoloniferum* (right). Graham Cave State Park, 2 November 2017. Photo by Lorie Volenberg.

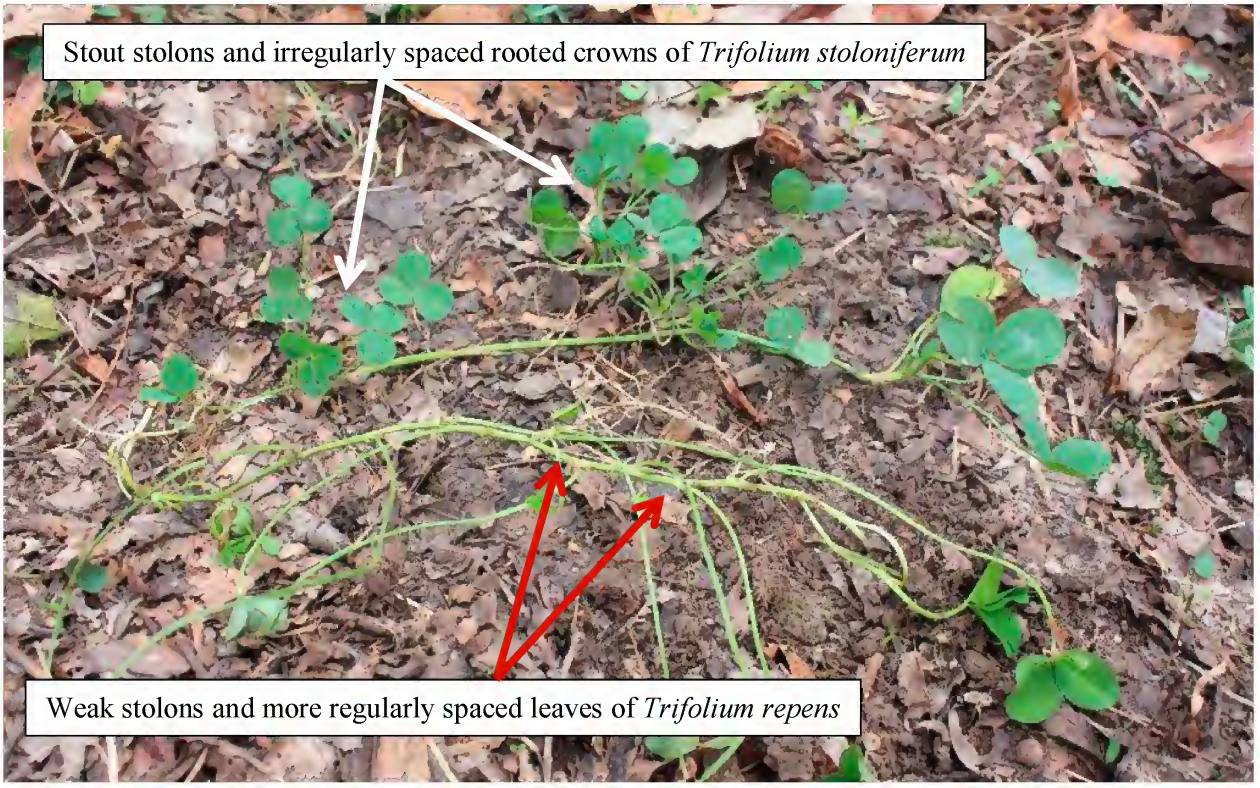

Stout stolons and irregularly spaced rooted crowns of *Trifolium stoloniferum*
Weak stolons and more regularly spaced leaves of *Trifolium repens*

Figure 6. Side by side comparison of *Trifolium stoloniferum* (upper) and *T. repens* (lower), Graham Cave State Park, 2 November 2017. Photo by Lorie Volenberg.

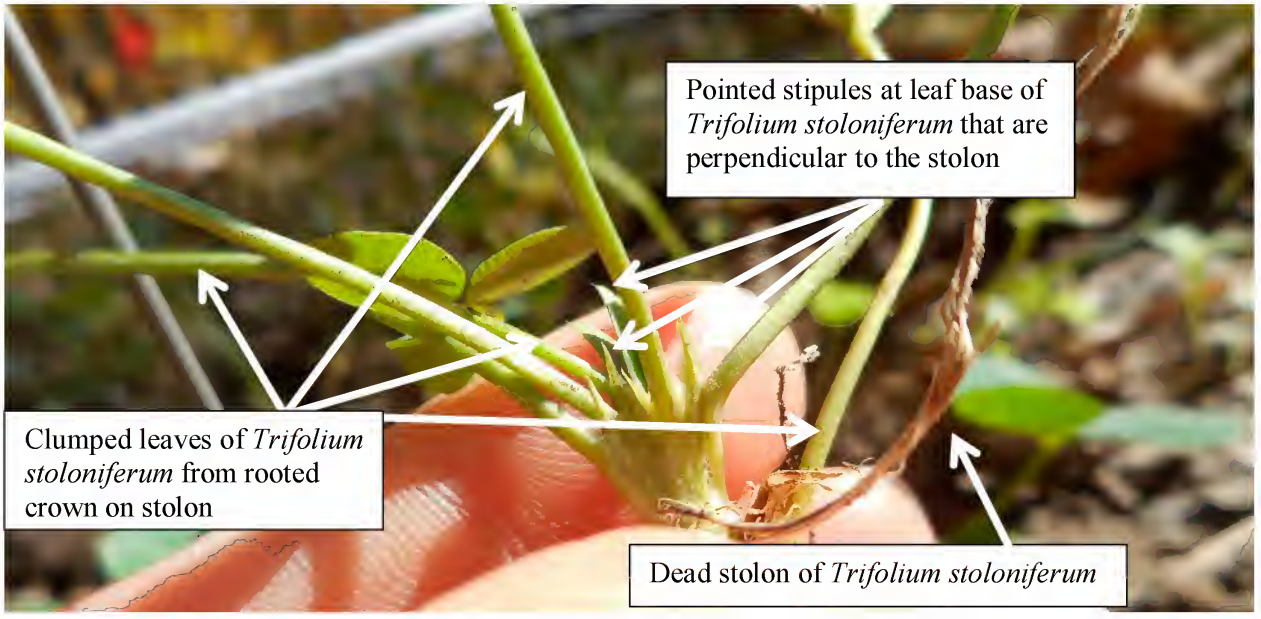

Pointed stipules at leaf base of *Trifolium stoloniferum* that are perpendicular to the stolon
Clumped leaves of *Trifolium stoloniferum* from rooted crown on stolon
Dead stolon of *Trifolium stoloniferum*

Figure 7. Stipules at leaf bases, clumped leaf arrangement, and dead stolon of *Trifolium stoloniferum*. Graham Cave State Park, 2 November 2017. Photo by Lorie Volenberg.

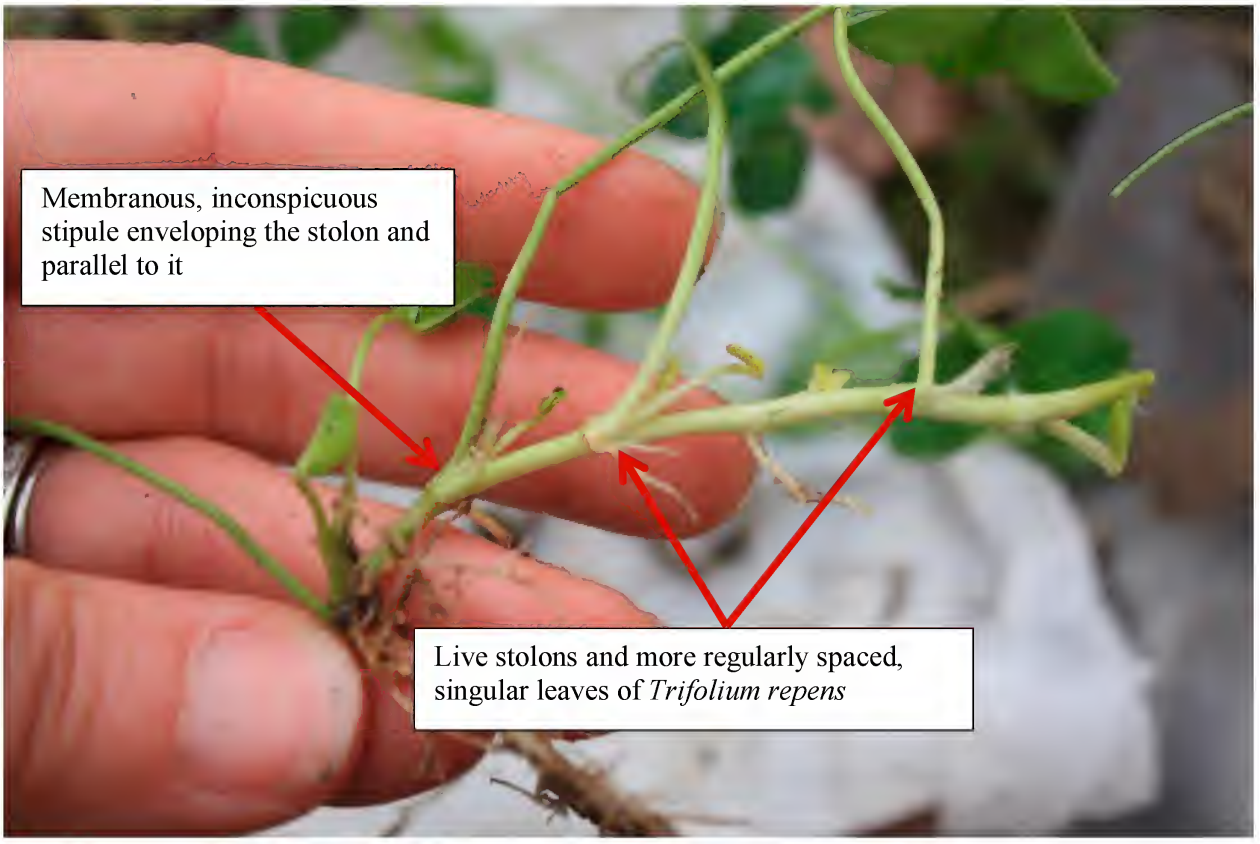

Membranous, inconspicuous stipule enveloping the stolon and parallel to it
Live stolons and more regularly spaced, singular leaves of *Trifolium repens*

Figure 8. More regularly spaced leaves of *Trifolium repens*. Note inconspicuous, membraneous stipule enveloping the stolon and parallel to it. Graham Cave State Park, 2 November 2017. Photo by Lorie Volenberg.

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Mimosa strigillosa (Fabaceae) new to Missouri

ANDREW P. BRAUN[1]

ABSTRACT. — Basic ecological, identification, nativity, and collection information are reported for the first collection of *Mimosa strigillosa* Torr. & A. Gray in Missouri.

INTRODUCTION

Mimosa strigillosa Torr. & A. Gray (Fabaceae), commonly known as powderpuff, herbaceous mimosa, or sunshine mimosa, is a perennial, herbaceous, vining legume nearly endemic to the Gulf Coastal Plain. It occurs from Florida to eastern Texas, north to southern Arkansas, with outlying populations in Tulsa County, Oklahoma, and Pope, Massac, and Alexander counties in southernmost Illinois (Basinger 2003; Kartesz 2015). Typical habitats throughout its range include riverfront forests and disturbed areas (Basinger 2003; Weakley 2015; Claire Ciafré, pers. comm.; pers. obs.).

A population of *M. strigillosa* was recently discovered at Donaldson Point Conservation Area in New Madrid County, Missouri, representing the first report of this species in the state (Figure 1). The population occupied a patch approximately five m^2 in area, growing along a gravel road in a riverfront forest near the Mississippi River, in sandy soil below a moderately closed canopy. Both flowering and fruiting stems were present on 24 August 2017. Associates included *Ambrosia trifida* L., *Campsis radicans* (L.) Seem. ex Bureau, *Desmanthus illinoensis* (Michx.) MacMill. ex B.L. Rob. & Fernald, *Heliotropum indicum* L., *Leptochloa panicea* (Retz.) Ohwi, *Rubus trivialis* Michx., *Spermacoce glabra* Michx., *Sida spinosa* L., and *Toxicodendron radicans* (L.) Kuntze.

> Voucher Specimen: **U.S.A. MISSOURI**: NEW MADRID CO.: Donaldson Point Conservation Area. 6.5 kilometers E-SE of New Madrid. UTM 16 S 0278730 4049529 (-89° 28.3575, 36° 33.9363). 24 August 2017, *Braun 20170824.02* (MO).

Mimosa strigillosa would key imperfectly to *Mimosa* or *Acaciella* in Yatskievych's (2006) treatment of Mimosoideae, depending on the specimen. Flower color, stem armament, and fruit characters would confound the use of the key. Several characteristics distinguish *M. strigillosa* from *M. nuttallii* (DC. ex Britton & Rose) B.L. Turner, the more widespread *Mimosa* in Missouri:

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Stems densely armed; fruits linear, subterete; peduncles erect to spreading……*M. nuttallii*
Stems unarmed or with a few sparse prickles; fruits oblong-reniform, laterally compressed; peduncles all erect……*M. strigillosa*

Figure 1. *Mimosa strigillosa*, New Madrid County, Missouri. **A**: inflorescence; **B**: infructescence; **C**: foliage. All photos by the author.

In addition to the key characters above, *M. nuttallii* occurs in prairies, glades, open woodlands, roadsides, and other dry communities in the Ozark and prairie ecoregions of Missouri, while *M. strigillosa* typically occurs in riverfront forests, lawns, and other disturbed areas of the Mississippi River Alluvial Plain.

DISCUSSION

Basinger (2003) debated whether the Illinois populations were native, but ultimately suggested that the species may be adventive there based on the presence of adventive associated taxa in one population, the distance from the nearest population, and a possible dispersal vector (river barge traffic). Oklahoma's single population is likewise considered adventive in the state (Kartesz 2015). Spread of this species may have increased following the 2006 release of *M. strigillosa* "Crockett Germplasm" in the southern United States by the U.S. Department of Agriculture's Natural Resource Conservation Service for use as forage, landscaping, and lawn replacement (USDA 2012). However, the Illinois collections in Massac and Alexander counties were made in 2000 and 2002, respectively, indicating that these populations had been established before the release of Crockett Germplasm, although it is possible that it could have arrived by other anthropogenic means.

It is likely that the Missouri population, downstream of the Illinois populations, likewise does not represent escaped Crockett Germplasm material. The Missouri population of *M. strigillosa* is associated with mostly native (albeit weedy) flora. Several native coastal plain species occur disjunctly at the northernmost edge of the Mississippi embayment, particularly species associated with upland sand communities. New Madrid county is a reasonable distance (approximately 280 km) from the core range of this species farther south. In the past few decades, a few southern species appear to have expanded their ranges northward. These include *Eupatorium rotundifolium* L., *Eupatorium torreyanum* Short & Peter, and *Tipularia discolor* (Pursh) Nutt. (Justin Thomas, pers. comm.; pers. obs.). It is plausible that this population may also be recently migrated and should be considered a native occurrence. The apparent preference of this species for disturbed areas indicates that *M. strigillosa* should be assigned a low coefficient of conservatism for this region.

LITERATURE CITED

Basinger, M.A. 2003. *Mimosa strigillosa* Torrey & A. Gray (Mimosaceae) in Illinois. Transactions of the Illinois State Academy of Science. 96(3):177-178.

Kartesz, J.T., The Biota of North America Program (BONAP). 2015. *North American Plant Atlas.* (http://bonap.net/napa). Chapel Hill, N.C. [maps generated from Kartesz, J.T. 2015. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). (in press)].

United States Department of Agriculture – Natural Resources Conservation Service. 2012. Release Brochure for Crockett Germplasm Herbaceous Mimosa (*Mimosa strigillosa*). Nacogdoches: East Texas Plant Materials Center, 2 pp.

Weakley, A.S. 2015. Flora of the Southern and Mid-Atlantic States. Working draft 21 May 2015.

Yatskievych, G. 2006. Steyermark's Flora of Missouri. Volume 2, revised ed. Missouri Botanical Garden Press, St. Louis.

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Floristic Sublimity

BOOK REVIEW

Flora of the Chicago Region: A Floristic and Ecological Synthesis,
by Gerould Wilhelm and Laura Rericha.
2017. Indiana Academy of Science, Indianapolis. xvii + 1371 pp.
[ISBN 9781883362157 (hardbound)]

Reviewed by:
JUSTIN R. THOMAS[1]

The appeal of field botany rests within the deeply human drive to explore and understand nature; it is heuristic and phenomenological. Touching soil and roots where each greets the other, witnessing and pondering the complexity that drives phytoecological trends, and experiencing the awakening that comes from understanding place through process are as characteristically human as speech, bipedalism, and wielding fire. To fulfill this destiny, a field botanist needs only keen eyes, a compulsion to explore, and a good flora to guide them on their path to botanical and ecological enlightenment. The new *Flora of the Chicago Region: A Floristic and Ecological Synthesis*, by Gerould Wilhelm and Laura Rericha, is the most contemporary and thorough manifestation of this endeavor.

Long anticipated, the new flora came out in early 2017 as both an update and upgrade of the long esteemed fourth edition of *Plants of the Chicago Region*, by Floyd Swink and Gerould Wilhelm, published in 1994. Like its predecessor, the new flora covers the 22-county area around the southern tip of Lake Michigan and encompasses portions of Illinois, Indiana, Michigan and Wisconsin. This reboot includes over 600 new vascular plants, for a total of 3,149 taxa. It also includes descriptions of all plant taxa, nomenclatural etymology, surficial geology maps, updated distribution maps, a natural divisions map, natural community descriptions with gorgeous photographs, numerous line drawings, several color plates with close-up images of stamens, styles and nectaries of select species and much, much more.

As with the old edition, each entry includes a list of associated plant taxa for the communities in which that taxon occurs; this has long proven to be a better way of inferring habitat than simply listing a community type. The real game changer, however, is the addition of non-plant (mostly insect) associates that are provided for most plant species. This is largely the contribution of co-author Laura Rericha whose entomological prowess is unrivaled. Thus, for a

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commonly known species like *Schizachyrium scoparium* (little bluestem), one will not only learn what its associated plant species are in wet-mesic sand prairies, dry to dry-mesic prairies, and prairie fens, but also that a black leaf beetle, *Anisostena nigrita*, mines the blades, that the Eastern Towhee utilizes the tussocks for nesting and thermally regulated incubation, that numerous ant species nest in the root zone (each is listed), that a rust called *Puccinia andropogonis* infects the herbage and a smut called *Sporisorium everhartii* is frequently encountered on the spikelets. This additional information is a giant step toward the consilience and concinnity of which Dr. Wilhelm has long spoken, and furthers the precept that knowing the flora is merely a gateway into knowing an entire system.

The taxonomic treatments in the flora are unparalleled and demonstrate the level of clarity and richness that decades of studying plants as manifestations of living systems, and their names as human constructs, should entail. The treatments also exemplify intimate knowledge and wise consideration of the primary taxonomic literature; one only need examine the care and detail evident under *Dichanthelium* and *Rubus* for proof. The species concepts are lenient, robust and well argued. The numerous nomenclatural updates and innovations are not so eccentric as to alienate the professional user nor so erudite as to stupefy amateurs grown dependent on the older version. In the fashion of the previous work, the keys have been distilled to their most potent characters, with elaboration included only where necessary. The book itself is hefty, ornate, and well-constructed. This, combined with the constitution of its contents, makes it very well deserving of the rich tapestry of communities and species that make the Chicago region so wonderfully unique.

The ancillary information found in this flora reads like a field botanist's manifesto. It is dripping with a wild-honey philosophy that both asks and allows the reader to ponder not only the "lilies of the field," but the soil in which they grow, the insects that pollinate them, and the observer's place in the field itself. The preface explains that the first purpose of the flora is "to provide the student with a means to identify vascular plants." The second purpose is "to provide the user with an appreciation that plants are not stand-alone taxonomic integers in a landscape matrix, but rather, self-replicating genetic entities inextricably woven into a broader array of life adapted to a particular place, defined in part by climate, geography, soils, physiography, geologic age and history, and relationship with human culture." At a time when science is myopically focused on plants as "taxonomic integers," and overly obsessed with testing hypotheses by algorithm and computer modulation, where field botany is passed off as the epitome of antiquation, this work comes as a breath of fresh air and a much-needed confirmation that the study of organisms as they occur in nature is simultaneously existential, life-affirming, and whole-heartedly scientific.